FURTHER NOTES ON THERMOMETER CRICKETS.

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THE article on "The Cricket as a Thermometer" by Professor Dolbear in the November *Naturalist* reminds us of a series of somewhat similar observations upon the chirping of the tree cricket (*Œcanthus niveus*) which we made in Lincoln, Nebr., during August and part of September of the past summer.

Noticing that the rate of chirping was approximately the same in different parts of the city for any particular time, but that this rate varied in a marked degree from day to day, we were led to make an investigation of the conditions accompanying these variations. We began taking observations upon this rate along with thermometer readings on August 13.

Finding that each cricket remained in the same tree for days at a time and that in different trees the rate was often slightly different, we thought best to take a series of observations on certain individual insects. These were designated for convenience as A, B, C, etc. For example, we found that at a temperature of 66.5° F., B chirped 122, E 121, F 122, and G 118 times per minute. Through a quite wide temperature range G almost invariably chirped at a lower rate than either E or F.

Observations were made on the rate of chirping of eight different crickets for periods ranging from a few days to about three weeks. Some could be distinguished for only a few days, while others, notably E and F, chirped very regularly every evening for three weeks or more. On evenings when the temperature was falling rapidly, observations were made several times, with results very markedly showing the effect of temperature change. For A five different observations were made, for B nine, C four, D one, E thirty, F twenty-two, G ten, and H five.

One cool evening a cricket was caught and brought into a warm room. In a few minutes it began to chirp nearly twice as rapidly as the out-of-door crickets. Its rate very nearly conformed to the observed rate maintained other evenings out of doors under the same temperature conditions.

From this series of observations we found that the rate of chirping was, as Professor Dolbear says, very closely dependent on the temperature.

Plotting the chirps per minute as ordinates, and temperatures (degrees Fahrenheit) as abscissæ, we obtained a series of points whose maximum deviation from a straight line was only about six per cent. From this we deduced the relation

$$T = 60 + \frac{N - 92}{4.7},$$

where T stands for temperature, and N for chirps per minute. For temperatures between 60 and 80 this equation is accurate within one

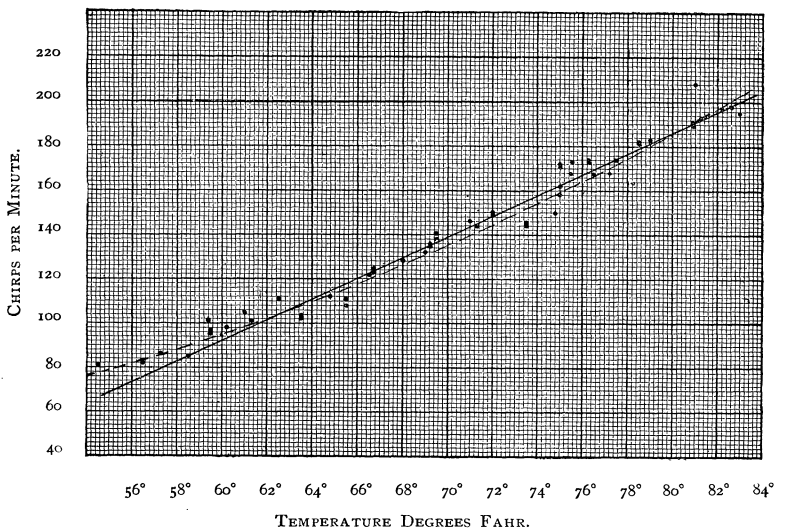

Figure showing the correspondence between temperature and rate of chirping. The solid straight line conforms to the formula; the dotted curved line is evidently somewhat closer to the observed facts.

or two degrees. Below 60, however, the insects chirp at a somewhat faster rate than would be expected from the formula, and consequently the calculated temperatures would be two or three degrees too high.

This deviation shows that the actual relationship between the rate of chirping and temperature cannot be exactly expressed by a straight line, as in our diagram, but should rather be expressed by a curve approximating that shown in the figure by the dotted line.

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